



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,781	10/11/2005	Nigel Paul Schofield	M02B162	4221
20411 7590 04/18/2008 THE BOC GROUP, INC. 575 MOUNTAIN AVENUE MURRAY HILL, NJ 07974-2064				
EXAMINER				
STIMPERT, PHIL PEARL				
ART UNIT		PAPER NUMBER		
3746				
MAIL DATE		DELIVERY MODE		
04/18/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/536,781

Applicant(s)

SCHOFIELD, NIGEL PAUL

Examiner

Philip Stimpert

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 October 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date 5/26/2005
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Inventor's Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the plurality of drag pumping mechanism rotors attached to the turbomolecular pumping mechanism rotor as in claims 5-6 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9 and 17-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Regarding claims 9 and 17-19, each of these claims recites "the rotor," multiple times in reference to elements which have not been previously recited as having a rotor. Thus these claims are rendered indefinite by the lack of antecedent basis of the recitations of "the rotor."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9 and 13-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Stones (US 6,135,709).

5. Regarding claim 1, Stones teaches a vacuum pumping arrangement comprising a turbomolecular pumping mechanism (50) having a rotor (9) with rotor blades (54), and a molecular drag pumping mechanism (2) connected in series (col. 3, ln. 12-16) with the turbomolecular pumping mechanism (50), and that a rotor (9) of the molecular drag pumping mechanism (2) is supported by the rotor blades (54) of the turbomolecular

pumping mechanism (50). The rotor (9) of the molecular drag pumping mechanism (2) may be considered to be supported by the the rotor blades (50) in at least two senses. First, the rotor (9) and the blades (54) are fixedly connected (as shown in Fig. 3) and the blades would be expected to experience some level of reaction forces from the pumped fluid during operation, thus exerting a supporting effect on the combined blades (54) and rotor (9). Further, and more simply, "by" may also mean "in physical proximity to," and the rotor is certainly supported during operation (by the shaft 6) and is in physical proximity to the rotor blades (54).

6. Regarding claim 2, Stones teaches an annular ring (at the interface between the blade supports, shaft, and rotor 9) provided to the rotor blades (54) to which the rotor (9) of the molecular drag pumping mechanism (2) is fixed.

7. Regarding claim 3, Stones teaches that the turbomolecular pumping mechanism (50) has a plurality of stages (as shown in Fig. 3), and that the rotor blades (54) as a whole are provided with the annular ring.

8. Regarding claim 4, Stones shows in Fig. 3 an inner cylinder (of the two Holweck type cylinders shown in Fig. 3) of the molecular drag pumping mechanism (2), which is supported in a position approximately half way along the radial length of the rotor blades (54) of the upper stage of the turbomolecular pumping mechanism (50).

9. Regarding claim 5, Stones teaches two Holweck type molecular drag pumping cylinders in Fig. 3, which, as they each provide an independent pumping action, may be considered a separate rotor, and thus together constitute a plurality of rotors. Further, this plurality of molecular drag rotors are considered to be supported by the blades (54)

of the turbomolecular pumping mechanism (50) in the manner detailed above with respect to claim 1.

10. Regarding claim 6, the two Holweck type molecular drag pumping cylinders taught by Stones each constitute an annular ring and which are radially spaced from each other, and which are substantially fixed to the rotor blades (54).

11. Regarding claim 7, Stones teaches two physically parallel pumping paths on either side of each Holweck cylinder in Fig. 3 (the radially inward path pumping upward, the radially outward path pumping downward).

12. Regarding claim 8, Stones teaches that the molecular drag pumping mechanism (2) is a Holweck type pump (col. 2, ln. 7).

13. Regarding claim 9, in Fig. 3, Stones teaches two distinct rotors of the molecular drag pumping mechanism (2), each of which is supported by the rotor (9), which is also the rotor of a regenerative pumping mechanism (1).

14. Regarding claim 13, the inner cylinder (of the two Holweck type cylinders shown in Fig. 3) of the molecular drag pumping mechanism (2) is supported in a position approximately half way along the radial length of the rotor blades (54) of the upper stage of the turbomolecular pumping mechanism (50).

15. Regarding claim 14, Stones teaches two physically parallel pumping paths on either side of each Holweck cylinder in Fig. 3 (the radially inward path pumping upward, the radially outward path pumping downward).

16. Regarding claims 15-16, Stones teaches that the molecular drag pumping mechanism (2) is a Holweck type pump (col. 2, ln. 7).

Art Unit: 3746

17. Regarding claims 17-19, in Fig. 3, Stones teaches two distinct rotors of the molecular drag pumping mechanism (2), each of which is supported by the rotor (9), which is also the rotor of a regenerative pumping mechanism (1).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stones in view of Rourk (US 4,465,434).

20. Stones does not teach the use of specific materials in his vacuum pump.

However, it is known that turbomolecular and molecular drag pumps generate heat.

Rourk teaches a carbon fiber composite turbine wheel, and that the use of carbon fiber composites increases the temperature at which a rotor may operate. Rourk further teaches that in his particular structure, "interlaminar shear stress associated with load transfer from radial to circumferential is minimized," (col. 2, ln. 3-5). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the rotor of the molecular drag pump of Stones from a carbon fiber composite as taught by Rourk in order to increase heat resistance and minimize interlaminar shear stress.

21. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stones in view of Schofield (US 5,230,924).

22. Regarding claims 11-12, Stones does not teach the use of specific materials in his vacuum pump. Schofield teaches that aluminum is generally useful for combined regenerative/Holweck pumps (col. 3, ln. 26-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use aluminum to form elements of the vacuum pump of Stones.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hablanian (US 5,374,160) teaches a vacuum pump having serially connected turbomolecular and molecular drag pumps.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571)270-1890. The examiner can normally be reached on Mon-Fri 7:30AM-4:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3746

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3683

/P. S./
Examiner, Art Unit 3746
14 April 2008